

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE – PILANI, K. K. BIRLA GOA CAMPUS
SECOND SEMESTER, 2022-23
CHEM F241, Inorganic Chemistry II
Midsemester examination (Closed Book)
Date: 17-03-2023, Duration: 90 minutes, Max. Mark: 60

Instructions: Answer all the questions. Do not use pencil.

1. (a) Explain the geometry around Cd ion in $[\text{Cd}(\text{OAr})_2(\text{thf})_2]$.



(b) Comment on the coordination number in the compounds with molecular formula $\text{MCl}_2(\text{Et}_4\text{dien})$ ($\text{M} = \text{Co}, \text{Ni}$). [2 marks]

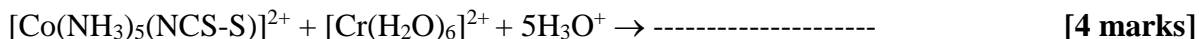
(c) Draw the structure of $\text{Mn}(\text{CO})_4\text{NO}$. [2 marks]

(d) Draw the structure of the intermediate in the reaction between $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+}$ and $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ under acidic conditions? [2 marks]

(e) What is the main difference between inner sphere and outer sphere electron transfer mechanisms? [2 marks]

2. (a) The choice of a leaving group in a square planar complex is determined by the nature of the ligand trans to it – comment on this statement with suitable examples. [4 marks]

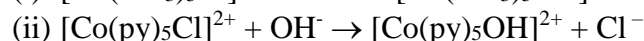
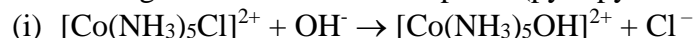
(b) How many cobalt complexes will be formed during the following reaction? Explain this reaction in detail.



(c) Draw the required diagrams and explain in detail a case in which a nearly square planar complex shows optical activity. [4 marks]

3. (a) Explain the ratio of isomer distribution of product(s) in the reactions of *cis*- and *trans*- $[\text{CoCl}(\text{en})_2\text{OH}]^+$ with water, with required diagrams (en = ethylenediamine). [5 marks]

(b) Which of the following reaction is faster? Explain. (py = pyridine) [5 marks]



4. (a) Draw the required diagrams and explain in detail the isomerism shown by bis(benzoylacetato)beryllium. [6 marks]

(b) What are the different mechanisms by which coordination complexes undergo ligand exchange reactions? Explain in detail. [4 marks]

5. (a) Explain in detail Monsanto acetic acid synthesis. [6 marks]

(b) With the help of suitable example, explain the difference in bonding between metal-alkene complexes and metal-carbene complexes. [6 marks]

(c) Based on the principle of microscopic reversibility, explain the mechanism of the following reaction.



END